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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,128	06/27/2003	Tatsuo Kobayashi	116378	5575

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OLIFF & BERRIDGE, PLC
P.O. BOX 19928
ALEXANDRIA, VA 22320

EXAMINER	
GIMIE, MAHMOUD	
ART UNIT	**PAPER NUMBER**
3747	

DATE MAILED: 07/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/607,128	KOBAYASHI, TATSUO	
	Examiner	Art Unit	
	Mahmoud Gimie	3747	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,16-22 and 26-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,11-17,20-24 and 26-29* is/are rejected.

7)☒ Claim(s) *7-10,18 and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-6,11-17, 20 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Loyd (4,414,940) in view of Hsu (5,365,902).

Loyd discloses an internal combustion engine that compresses an air-fuel mixture containing a fuel and the air in a combustion chamber and makes the compressed air-fuel mixture subjected to combustion, so as to output power, said internal combustion engine comprising:

an air-fuel mixture compression mechanism that compresses the air-fuel mixture in said combustion chamber;

a first fuel-air mixture production module (38) that produces a first fuel-air mixture containing a first fuel (main) and the air at a specific ratio, which avoids auto ignition of the first fuel-air mixture through the compression by said air-fuel mixture compression mechanism (avoids auto ignition in the absence of a pilot) , in said combustion chamber;

a second fuel-air mixture production module (36) that supplies a second fuel (pilot), into a partial area of said combustion chamber, so as to produce a second fuel-air mixture; and

an ignition module (40) that ignites the second fuel-air mixture (pilot), so as to compress and auto-ignite the first fuel-air mixture after producing said first fuel-air mixture (the "so as to" clause is an end result that the prior art is capable of doing because it has an equivalent structure).

Loyd does not show the second fuel (pilot) being different from the first fuel.

Hsu discloses a main and a pilot fuel which is more readily flammable than the main fuel.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Loyd by introducing a pilot fuel that is more readily flammable than the main fuel. The motivation to do so would have been to improve combustion of the main fuel.

Please note that the "so as

With regard to claim 2, wherein said second fuel-air mixture production module (pilot injector nozzle 36) injects, as the second fuel, a fuel having a higher octane value (within proposed alternative fuels) than that of the first fuel, so as to produce the second fuel-air mixture.

With regard to claim 3, wherein said second fuel-air mixture production module injects, as the second fuel, a combustible gas, so as to produce the second fuel-air mixture.

With regard to claims 4-6, hydrogen, alcohol or methyl are suggested by Loyd, col. 3 and ll. 44.

With regard to claim 11, wherein said fuel-air mixture compression mechanism rotates a crankshaft to lift a piston up in said combustion chamber, thereby compressing the air-fuel mixture in said combustion chamber, and said second fuel-air mixture production module makes the second fuel injected from said cylinder injection valve to produce the second fuel-air mixture in a preset term from 30 degrees as a rotational angle of said crankshaft prior to a top dead center in a compression cycle (col. 5 and ll. 59-61), at which said piston reaches its maximum height after compression of the air-fuel mixture, to the top dead center in the compression cycle.

With regard to claims 12-15, the piston has a recess (19) with a rim defined by a sidewall, see figure 1.

With regard to claims 16-17, the top face of the piston has at least one groove, see figure1.

With regard to claim 20, see col. 5 and ll. 59-60, for prior to top dead center.

With regard to claims 26-29, the limitations have been addressed in the above rejections.

3. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Loyd (4,414,940) in view of Gray, Jr. (6,651,432)

Loyd discloses all the limitations as applied to claims 1-6,11-17, 20 and 26-29 above except for intake fuel injection and catalyst.

Gray, Jr. discloses an intake (53) and cylinder (23) fuel injection and a catalyst (51)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Loyd as applied to the above claims by using intake fuel injection and a catalyst. The motivation to do so would have been to limit emissions to the environment.

Response to Arguments

4. Applicant's arguments filed 6/28/06 have been fully considered but they are not persuasive.

(a) Applicant argued that the main injection nozzle (38) does not produce a fuel air mixture that avoids auto ignition. This argument is not persuasive because in the absence of a pilot fuel injection, the air-fuel mixture avoids auto-ignition. Loyd teaches that the burning of the pilot air-fuel mixture is to chemically condition the air and gas in the combustion chamber for ignition. This means that in the absence of the burning of the pilot fuel-air mixture, the fuel and air mixture of the main injection produces a mixture that avoids auto ignition.

(b) Applicant argued that the ignition module of Loyd that ignites the second fuel- air mixture does not auto ignite the first fuel-air mixture after producing said first air-fuel mixture. This argument is not persuasive because the "so as to" clause is an end result clause that the reference is capable of doing because it has equivalent structure.

Allowable Subject Matter

5. Claims 7-10,18 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahmoud Gimie whose telephone number is 571-272-4841. The examiner can normally be reached on Monday-Friday between 7 a.m. -3:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen K. Cronin can be reached on 571-272-4536. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MG

MAHMOUD GIMIE
PRIMARY EXAMINER